REMARKS

Reconsideration and allowance of this application, as amended, are respectfully requested. The written description and claim 10 have been amended, and claim 11 has been canceled. Claims 10, 12-16, and 26 are now pending in the application. The rejection is respectfully submitted to be obviated in view of the amendments and remarks presented herein.

In the present Amendment, the written description has been amended to correct a misspelling at page 8 and to correct the description of the hollow lift rod 102b at pages 10 and 11. Claim 10 has been amended to incorporate a limitation previously recited in now-canceled claim 11, and has been editorially amended for improved readability.

Entry of each of the above amendments is respectfully requested.

35 U.S.C. § 103(a) – Saeki in view of Nakayama

Turning to the Office Action, claims 10-16 and 26 stand rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over U.S. Patent No. 5,460,684 to Saeki et al. (hereinafter "Saeki") in view of U.S. Patent No. 4,902,531 to Nakayama et al. ("Nakayama").

In the Amendment filed June 6, 2001, Applicants urged that the assertion in the previous Office Action that it would have been "obvious to modify Saeki et al. by using a rotating susceptor, as disclosed by Nakayama et al., *because it would have been anticipated to*

produce an expected result" (emphasis added), is insufficient to establish a *prima facie* case of obviousness. Applicants stated that the Office Action failed to either describe or even suggest *what* that "expected result" would be. In response, the present Office Action states that "[t]he expected result would be a method of plasma etching utilizing a rotating pedestal (i.e. susceptor) and a chuck for holding the wafer to be etched on the pedestal."

The rejection of claims 10-16 under § 103(a) as being unpatentable over Saeki in view of Nakayama is respectfully traversed. The combined disclosures would not have rendered obvious the embodiments of the method defined by any of now pending claims 10, 12-16, and 26.

As indicated above, claim 10 has been amended to incorporate a limitation previously recited in now-canceled claim 11. Applicants' claim 10 recites, *inter alia*, "coupling a chuck to a rotatable pedestal, the pedestal comprising a central bore having a hollow shaft disposed therein, the chuck and the pedestal cooperating to define a coolant chamber in fluid communication with the hollow shaft," "rotating the pedestal so as to rotate the coupled wafer," and "plasma etching the rotating wafer while cooling the chuck by communicating a coolant through the hollow shaft to the coolant chamber."

The claimed invention would not have been obvious because there is no suggestion or motivation, either in the references or in the knowledge generally available to one of ordinary skill in the art, to combine reference teachings.

Saeki is directed to a plasma etching apparatus. Nakayama is directed to "a method of and an apparatus for processing substrates in [a] vacuum chamber, such as chemical vapour deposition (CVD)" (column 1, lines 7-9).

Saeki's apparatus for removing material is not rotatable. Nakayama's method of processing employs an apparatus that is rotatable. There is no suggestion in either Saeki or Nakayama, however, to combine reference teachings so as to arrive at Applicants' claimed method of removing material which comprises "plasma etching the rotating wafer while cooling the chuck by communicating a coolant through the hollow shaft to the coolant chamber."

In fact, as indicated above, the Office Action states that by combining Saeki and Nakayama, "[t]he expected result would be a method of plasma etching utilizing a rotating pedestal (i.e. susceptor) and a chuck for holding the wafer to be etched on the pedestal.

Applicants' claimed method, however, is different from the "expected result" that is asserted in the Office Action. Applicants' claimed method includes "coupling a chuck to a rotatable pedestal, the pedestal comprising a central bore having a hollow shaft disposed therein, the chuck and the pedestal cooperating to define a coolant chamber in fluid communication with the hollow shaft," "rotating the pedestal so as to rotate the coupled wafer," and "plasma etching the rotating wafer while cooling the chuck by communicating a coolant through the hollow shaft to the coolant chamber."

At specification page 3, lines 1-7, Applicants disclose a particular problem associated with conventional methods of plasma etching:

> In [a] conventional pattern plasma etched apparatus, the chuck is stationary to allow for cooling. Non-uniform etching occurs, however, due to chamber design or process parameters resulting in undesirable film thickness deviations. These deviations in film thickness can be localized or spread across the entire film surface.

Then, at specification page 3, lines 9-19, Applicants describe their claimed invention as the solution to the aforementioned problem:

> The present invention overcomes these shortcomings by providing an internally cooled rotatable chuck for use in a semiconductor wafer plasma etching apparatus. By rotating the chuck and the wafer in an etching chamber, the effect of the inherent lack or excess of ions due to chamber design or process parameters can be minimized. The lack or excess of ions creating the etch can be spread across the entire wafer surface assuring all locations see the same etch parameters. Accordingly, a more efficient process with better film uniformity will be realized.

It is respectfully submitted, therefore, that there is neither a suggestion nor a motivation in the asserted combination to derive the embodiment of the invention defined by Applicants' independent claim 10. Thus, the asserted combination would not have rendered obvious the method defined by Applicants' claim 10.

Rejected dependent claims 12-16 and 26 are allowable along with claim 10, and on their own merits. For example, regardless of the assertion in the Office Action that "a

person having ordinary skill in the art . . . would have found it obvious to control the process parameters" defined in claim 15, there is, for all of the reasons outlined above, no suggestion in either Saeki or Nakayama to combine reference teachings so as to arrive at the method of plasma etching as defined in Applicants' independent claim 10. Addition of the step of initializing process parameters as defined by claim 15 simply contributes even further to the unobviousness of the claimed invention.

For at least the above reasons, reconsideration and withdrawal of the rejection of claims 10-16 and 26 under § 103(a) are respectfully requested.

In view of the above, each of the presently pending claims in this application is believed to be in immediate condition for allowance. Accordingly, the Examiner is respectfully requested to withdraw the outstanding rejection of the claims and to pass this application to issue.

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Respectfully submitted,

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Version With Markings to Show Changes Made

In the Written Description:

Please amend pages 7-8, bridging paragraph, as follows:

The pedestal 18 includes a cylindrical shaft 72 having a first end 72a and a second end 72b and a circular plate 74 attached to the first end 72a. The shaft 72 includes 3 sections 76, 78, 80. The first section 76 extends downwardly from the plate 74 to a first shoulder 76a that defines the beginning of the second section 78. The O-rings 56 in the block 36 engage the first section 76. The second section 78 includes a reduced outer diameter and extends downwardly from first shoulder 76a to shoulder 78a. The bearings 60a, 60b and spacer 62 engage the second section 78. A portion of the second section 78 extending from the second shoulder 78a includes threads to engage the end play adjustment nut 66. A pulley 86 is coupled to the second section 78 adjacent the second shoulder 78. A woodruff key 87 rotationally locks the pulley 86 to the shaft 72. The third section 80 extends from the second shoulder 78a to the second end 72b of the shaft 72 and includes a threaded portion adjacent the second shoulder 78a. A pulley lock nut 88 threadedly engages the portion of the [treaded] threaded third section 80 adjacent the second shoulder 78a to axially retain the pulley 86 on the shaft 72. Thus, the pedestal 18 is free to rotate in the block 36, but is substantially axially fixed in the block 36.

Please amend page 10, line 8, through page 11, line 4, as follows:

The pedestal 18 includes a longitudinal central bore 72c extending through the shaft 72 and plate 74. The chuck 16 is mounted to the top of the plate 74 and cooperates

with the plate 74 to define a coolant chamber 100. A plurality of slots 16a formed in the face of the chuck 16 are in fluid communication with the chamber 100. A spider assembly 102 includes a spider 102a disposed in the coolant chamber 100 and a hollow lift rod 102b disposed in the central bore 72c. As the bellows assembly 92 moves in response to actuation of the lift actuator 104, the [push] hollow lift rod 102b moves between a wafer unloading position, corresponding to the compressed position of the bellows assembly 92, and a wafer clamping position, corresponding to the relaxed position of the bellows assembly 92.

A rotational coupler 114 couples a helium source (not shown) to the lower bellows flange 92b and the pedestal 18. The rotational coupler 114 is coupled to a vented screw 116 that allows helium to pass from the rotational coupler 114 to the hollow lift rod [118] 102b. Thus, the rotational coupler 114 and the vented screw 116 move with the lift rod [118] 102b in response to actuation of the lift actuator 104. The lift rod [118] 102b conveys helium to the coolant chamber 100 and the slots 16a.

In the Claims:

Please amend the claims as follows:

10. (Twice amended) A method [for] of plasma etching a wafer, said method comprising [the steps of]:

coupling a chuck to a rotatable pedestal, the pedestal comprising a central bore having a hollow shaft disposed therein, the chuck and the pedestal cooperating to define a coolant chamber in fluid communication with the hollow shaft;

coupling the wafer to the chuck;

rotating the pedestal so as to rotate the coupled wafer; and

plasma etching the rotating wafer while [the pedestal is rotating] cooling the chuck by communicating a coolant through the hollow shaft to the coolant chamber.